

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 2/3/2010 has been entered.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hampden-Smith et al. (US 2005/0112056) in view of Edlund et al. (US 2002/0114984).

Regarding claim 1, Hampden-Smith discloses a fuel supply apparatus for providing a hydrogen-rich reformat, the fuel supply apparatus comprising:

a reforming reactor (single-step reformer, paragraph [0251]) comprising a catalyst bed for converting a hydrocarbon fuel to a reformat (see abstract), the catalyst bed comprising a reforming catalyst and a carbon dioxide fixing material (paragraph [0209]);

a hydrogen storage device (paragraph [0252]) in fluid communication with the reforming reactor for storing a portion of the reformat;

a reformat outlet (hydrogen product) in fluid communication with the hydrogen storage device (paragraph [0252]).

While Hampden-Smith discloses utilizing the reforming reactor in conjunction with a hydrogen storage device which provides hydrogen fuel to a fuel cell (paragraph [0252]), Hampden-Smith does not explicitly disclose a controller in communication with the reforming reactor and the hydrogen storage device for controlling the delivery of reformat to the reformat outlet.

Edlund also discloses a reforming reactor (fuel processor, 12) in communication with a hydrogen storage device (60) which provides hydrogen to a fuel cell (78). Edlund teaches a controller (120) that controls a valve (106) that supplies the reformat (56) to the hydrogen storage device (60) as a preferable way of regulating flow to the hydrogen storage device and the fuel cell (paragraph [0045]).

It would have been obvious to one of ordinary skill in the art to add a controller, as in Edlund, to the communication means from the reforming reactor to the hydrogen storage

device of Hampden-Smith as a preferable way of regulating the flow of reformat to the hydrogen storage device and the fuel cell.

5. Claims 1-3, 5-7 and 11-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sircar et al. (US 6,103,143) in view of Edlund et al. (US 2002/0114984).

Regarding claims 1, 7, 11 and 12, Sircar discloses a fuel supply apparatus for providing a supply of hydrogen-rich reformat, the fuel supply apparatus comprising:

a reforming reactor (10) comprising a catalyst bed (26, 27) for converting a hydrocarbon fuel to a reformat (see abstract), the catalyst bed comprising a reforming catalyst (26) and a carbon dioxide fixing material (adsorbent, 27);

While Sircar discloses a fuel processing apparatus designed to produce hydrogen rich product which can be used in a fuel cell (col. 1 lines 58-64), and which requires regeneration (see abstract), Sircar fails to explicitly disclose the placement of the preferential fuel processing apparatus in a fuel cell and fuel processing system with a compressor and high pressure storage device. Sircar also fails to disclose a controller that controls the operation of the hydrogen storage device and the flow rate of reformat to the hydrogen storage device.

Edlund also discloses a fuel processing apparatus (12) designed to produce hydrogen rich product for a fuel cell (78). Edlund teaches a fuel processing system comprising:

a hydrogen storage device (high pressure cylinder, 60, paragraph [0036])) in fluid communication (see Fig. 6) with a compressor (62) and a reforming reactor/fuel processor (12) for storing a portion of the reformat (paragraph [0034] and [0036]);

a reformat outlet (56) in fluid communication with the hydrogen storage device (see Fig. 6); and

a controller (120) in communication with the reforming reactor and the hydrogen storage device for controlling the delivery of reformat to the reformat outlet (paragraph [0045]), said controller also controlling the hydrogen storage device and the delivery of reformat to the hydrogen storage device (paragraph [0045])

Edlund teaches this system as a preferable way of utilizing hydrogen from a reforming reactor/fuel processor (12) in a way to power a fuel cell and maintain storage capacity of hydrogen in the event of temporarily losing the function of the reforming reactor (see abstract and paragraph [0068]).

It would have been obvious to one of ordinary skill in the art at the time of the invention to add the fuel processing system of Edlund as described above to the reforming reactor of Sircar as a preferable way of providing continuous reformat flow to a fuel cell while maintain function of said fuel cell when the reforming reactor of Sircar is not functional (such as during regeneration).

Regarding claim 2, Sircar, as discussed in claim 1 above, further discloses a single reaction bed (see Fig. 1).

Regarding claim 3, Sircar, as discussed in claim 1 above, further discloses a water gas shift reaction taking place in said catalyst bed (col. 17 lines 6-28).

Regarding claim 5, Sircar, as discussed in claim 1 above, further discloses a heat generating means connected to the reactor (col. 4 lines 44-47).

Regarding claim 6, Sircar, as discussed in claim 1 above, further discloses a pressure swing adsorber (PSA) for purifying said reformat (col. 15 lines 22-30).

Regarding claims 13-15, Sircar, as discussed in claim 1 above, further discloses the reforming reactor is operable in a non-reforming mode (such as regeneration, see abstract). Furthermore, regarding limitations recited in claims 13-15 which are directed to a manner of operating disclosed system, neither the manner of operating a disclosed device nor material or article worked upon further limit an apparatus claim. Said limitations do not differentiate apparatus claims from prior art. See MPEP §2114 and 2115. Further, process limitations do not have a patentable weight in an apparatus claim. See *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969) that states “Expressions relating the apparatus to contents thereof and to an intended operation are of no significance in determining patentability of the apparatus claim.

Regarding claim 16, Sircar, as discussed in claim 1 above, further discloses a hydrogen-consuming device (fuel cell) downstream of said reforming reactor and utilizing said reformat (col. 1 lines 58-64).

Regarding claim 17, Sircar, as modified by Edlund in claim 16 above, further discloses that said controller communicates with said hydrogen-consuming device (fuel cell, paragraph [0048] of Edlund).

### ***Response to Arguments***

6. Applicant's arguments filed 2/3/2010 have been fully considered but they are not persuasive.

On pages 8 and 9, Applicant argues that combination of Sircar and Hampden-Smith with Edlund are not combinable because neither Sircar nor Hampden-Smith discloses a communication between the reforming reactor and the hydrogen storage device. The examiner respectfully disagrees with this argument. As best understood, Applicant appears to making an argument based on a single reference when the rejection is based on multiple references. Edlund teaches such a communication and discloses advantages of utilizing this communication (as discussed above). As such, it is the examiner's position that it would have been obvious to one of ordinary skill to utilize such advantages in the apparatuses of Sircar and Hampden-Smith.

### ***Conclusion***

7. This is an RCE of applicant's application. All claims are drawn to the same invention claimed in the earlier application and could have been finally rejected on the grounds and art of record in the next Office action if they had been entered in the earlier application. Accordingly, **THIS ACTION IS MADE FINAL** even though it is a first action in this case. See MPEP § 706.07(b). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period

will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no, however, event will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MATTHEW J. MERKLING whose telephone number is (571)272-9813. The examiner can normally be reached on M-F 8:30-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on (571) 272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. J. M./  
Examiner, Art Unit 1795

/Alexa D. Neckel/  
Supervisory Patent Examiner, Art Unit 1795